CLAIMS

1. Method for shaping, in particular forging, workpieces by use of a shaping machine (1) having at least one shaping tool, wherein

a) during the machining process a workpiece is handled by means of at least one handling device (3),

b) the position and/or orientation of the workpiece (2), in particular before machining of workpieces on the shaping machine (1), using this tool is/are determined by the fact that

b1) a detection device (3, 4, 4') approaches at least one predetermined reference surface (5, 6, 7, 8, 9, 10) on the tool (2) and detects at least one position or one point on this/these reference surface(s),

b2) the information corresponding to the detected position(s) of the reference surface(s) (5, 6, 7, 8, 9, 10), in particular signals or data from the detection device, is transmitted to an evaluating means (11) and

b3) from this information about the position(s) of the reference surface(s) the evaluating means (11) determines the position and/or orientation of the tool (2), and

c) the position and/or orientation of the tool (2) determined by the evaluating means is used as the basis for handling the tools by at least one handling device.

2. Method according to Claim 1, wherein the detection device comprises a handling device (3) equipped with at least one sensor (4, 4').

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3. Method according to Claim 2, wherein the handling device (3) for the detection device is also used as a handling device for handling the workpieces.

4. Method according to one or more of the preceding claims, wherein the position of the coordinate system or reference system of each handling device for handling the workpieces is calculated by the evaluating means from the detected position(s) of the reference surface(s) of the tool, in particular by use of translation imaging and/or rotary imaging.

5. Method according to one or more of the preceding claims, wherein the position(s) of the reference surfaces is/are used to detect at least three points in space, or, for the coordinate system or reference system, of at least one handling device for handling the workpieces.

6. Method according to one or more of the preceding claims, wherein the detection device detects at least two positions or points of this/these reference surface(s) by scanning the reference surface(s).

7. Method according to one or more of the preceding claims, wherein the detection device approaches at least three reference surfaces on the tool, preferably in a predetermined sequence, and in each case precisely detects one position or one point on each of these reference surfaces.

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8. Method according to one or more of the preceding claims, wherein the position(s) of the reference surfaces is/are used to determine a reference plane in space, or, for the coordinate system or reference system, of at least one handling device for handling the workpiece.

9. Method according to one or more of the preceding claims, wherein a reference plane in space, or, for the coordinate system or reference system, of at least one handling device for handling the workpieces, is determined from two positions of the reference surface(s) or two reference surfaces on the one hand, and from predetermined, additional linearly independent information, in particular information about a plane that is parallel to the reference plane.

10. Method according to one or more of the preceding claims, wherein the detection device or the handling device for the detection device approaches the reference surfaces on the tool from predetermined starting points.

11. Method according to Claim 10, wherein the starting points are located in the same configuration relative to one another as for the reference surfaces on the tool.

12. Method according to one or more of the preceding claims, wherein after replacing a tool first the position and/or orientation of the tool (2) is/are determined using the detection device (3, 4, 4') and the evaluating means (11) within the scope of a learning or calibration step, and then the handling of the workpieces is based on the determined position and/or orientation of the tool (2).

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13. Method according to one or more of the preceding claims, wherein before the position and/or orientation of the tool (2) is determined, at least one detection device (4, 4') or the sensor(s) thereof is/are tested by the detection device approaching a test surface (12, 13) preferably provided on a tool mounting.

14. Method according to Claim 13, wherein an alarm signal is issued when the test of at least one detection device (4, 4') determines an irregularity in the evaluating means (11).

15. Device for shaping, in particular forging, of workpieces, in particular for carrying out the method according to one of Claims 1 through 14, comprising

a) at least one shaping machine (1), in particular a forging machine,

b) at least one handling device (3) for handling workpieces,

c) at least one detection device (4, 4'),

d) at least one reference surface (5, 6, 7, 8, 9, 10) being provided on a tool (2) of the shaping machine (1) for scanning or recognition, using at least one detection device (4, 4'), and

e) an evaluating means (11) being provided which determines or is able to determine the position and/or orientation of the tool (2) from the data or signals transmitted from the detection device (4, 4').

16. Device according to Claim 15, wherein the detection device comprises a handling device (3) equipped with at least one sensor (4, 4').

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17. Device according to Claim 16, wherein the same handling device (3) is provided for determining the position and/or orientation of the tool (2) or for the detection device as well as for handling the workpieces.

18. Device according to Claim 16 or Claim 17, wherein the detection device comprises at least one sensor (4, 4') that operates in a contactless manner.

19. Device according to Claim 18, wherein at least one sensor (4, 4') is a proximity switch or proximity sensor, or an ultrasound sensor.

20. Device according to one of Claims 16 through 19, wherein the detection device comprises at least one sensor (4, 4') that operates in a contacting manner.

21. Device according to Claim 20, wherein at least one sensor (4, 4') is a short-circuiting switch or contact switch.

22. Device according to one or more of Claims 16 through 20, wherein the detection device, in particular the handling device (3) for the detection device, is equipped with (a) position measurement system(s) (14, 15) by which the position of at least one sensor (4, 4') in space can be determined.

23. Device according to one of Claims 15 through 22, wherein the handling device (3) has a gripper (16) for gripping a workpiece.

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24. Device according to Claim 23 and Claim 17, wherein at least one sensor (4, 4') is provided in the vicinity of the gripper.

25. Device according to one of Claims 15 through 24, wherein the reference surfaces (5, 6, 7, 8, 9, 10) on the tool (2) are designed as flat surfaces, of which at least two are oriented substantially at right angles relative to one another.

26. Device according to one of Claims 15 through 25, having at least one test surface (12, 13) by which the functioning of the handling device (3) and/or at least one sensor (4, 4') can be tested.

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